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Applicant: NABISCO BRANDS INC.  
9W. 57th Street  
New York, N.Y. 10019(US)

72

Inventor: Friello, Dominick R.  
King Street  
Danbury Connecticut(US)

72

Inventor: Parker, Ellery  
11 Pine Avenue  
Johnstown, N.Y.(US)

72

Inventor: Mackay, Donald A.M.  
135 Deerfield Lane  
Pleasantville, N.Y.(US)

72

Inventor: Cherukuri, Subraman Rao  
3 Mendes Road  
Danbury Connecticut(US)

74

Representative: Brauns, Hans-Adolf, Dr. rer. nat. et al,  
Hoffmann. Eitle & Partner, Patentanwälte  
Arabellastrasse 4  
D-8000 Munich 81(DE)

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Center-filled chewing gums, a sugarless liquid fill for same and a process for preparing them.

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Center-filled chewing gum is provided which includes as the center fill a dispersion of a thickener, such as carboxymethyl cellulose in glycerin, the glycerin functioning as both a sweetener and carrier, and the thickener functioning to retard increase in viscosity of the glycerin. Disclosed are furthermore a process for their production and a sugarless liquid fill for same.

1 CENTER-FILLED CHEWING GUMS A SUGARLESS LIQUID FILL FOR  
SAME AND A PROCESS FOR PREPARING THEM

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5 U.S. Patent No. 2,894,154 to Graff et al  
discloses a center-filled chewing gum which includes  
as a liquid fill an aqueous solution having a dis-  
solved solids portion, and a humectant for retarding  
increase in viscosity of the center fill. The  
dissolved solids portion may include invert sugar,  
sucrose and glucose, while the humectant is glycerine.

10 British Patent No. 1,469,031 discloses a  
center-filled chewing gum similar to that disclosed  
in U.S. Patent No. 3,894,154 except that in addition  
to glycerine, the humectant may be polylimonene,  
sorbitol solution, lecithin, dextrose, gum arabic,  
15 glyceryl monostearate, polyethylene glycol or  
propylene glycol.

U.S. Patent No. 4,156,740 to Glass et al  
discloses a center-filled chewing gum which includes  
in both the chewing gum shell and the center fill  
20 A. from 0.4 to 1 part by weight of a natural or  
synthetic gum, namely, carboxymethyl cellulose,  
pectin, propylene glycol, alginates, agar or gum  
tragacanth; B. from 50 to 84 parts by weight of  
a glycerin humectant; and C. from 15 to 49.6 parts  
25 by weight of an additional water-miscible humectant  
ingredient which is sorbitol solution or sorbitol  
solution and propylene glycol.

In accordance with the present invention,  
there is provided a center-filled chewing gum piece  
which includes an enclosed cavity containing a  
30 liquid fill formed of from about 94 to about 99.5%

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1 by weight of a glycerin dispersion containing from  
about 0.5 to about 6% by weight of a thickening  
agent, and optionally other sweeteners and flavors.

Surprisingly, it has been found that the  
5 substantially all glycerin center fill containing  
a small amount of thickener retains its liquidity  
in the center fill for surprisingly long periods  
of time while providing a pleasant sweet taste.  
Thus, the center-filled chewing gum of the invention  
10 will have an extended shelf-life.

As indicated, the liquid fill will be formed  
of substantially all glycerin. The glycerin which  
may be employed may be commercial grade, that is,  
it may contain 1 to 4% bound up water.

15 The glycerin functions as a sweetener and  
vehicle for flavor and/or other sweeteners and  
thus is particularly suitable for use in a sugarless  
liquid fill which will usually be employed in a  
sugar-free center-filled chewing gum.

20 The thickening agent or thickener is employed  
to increase the viscosity of the glycerin which  
itself is stable and comprises the center fill.  
The thickening agent will usually not dissolve in  
the center fill (glycerin) but will only appear to  
25 dissolve by forming a colloidal dispersion with the  
glycerin.

The thickening agent will be present in the  
center fill in an amount within the range of from  
about 0.5 to about 6% by weight based on the total  
30 content of the center fill, and preferably from

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1 about 1 to about 3% by weight of the center fill.

Examples of thickening agents which may  
be employed in the center fill together with  
glycerin include, but are not limited to, synthetic  
5 or natural gums, such as carboxymethyl cellulose,  
pectins, alginates, namely, esters of alginic  
acid, such as propylene glycol alginate, agar, gum  
tragacanth, hydroxypropyl cellulose, hydroxyethyl-  
cellulose, gelatin, and the like. The preferred  
10 thickening agent for use herein is carboxymethyl  
cellulose, which may be in the form of sodium  
carboxymethyl cellulose, and may have a viscosity  
of from 400 to 4,500 centipoises at 1% concentration,  
and more preferably a viscosity of 1000-3000 at  
15 1% concentration such as CMC 7HF or CMC 7MF (avail-  
able from Hercules, Inc.).

In addition, the center fill may contain  
flavor, for example, in the form of flavor oil,  
in an amount of from about 0.10 to about 0.75% by  
20 weight, and preferably, from about 0.10 to about 0.50%  
by weight.

Where the liquid fill is to include addi-  
tional sweetener, such sweetener may comprise a  
sugar sweetener, a sugar alcohol, or other non-sugar  
25 sweeteners. In the case where the additional  
sweetener is a sugar, such sugar may be present  
in an amount of from about 2 to about 15% by  
weight, and preferably, from about 3 to about 10%  
by weight; where the additional sweetener is a  
30 sugar alcohol such as sorbitol, and/or mannitol or

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1 xylitol, the sugar alcohol may be present in an  
amount within the range of from about 5 to about  
30% by weight, and preferably, from about 3 to  
about 15% by weight; where the additional sweetener  
5 is an artificial sweetener such as, for example,  
aspartame or Acesulfame-K (Hoechst), cyclamate, or  
other sweetener as described hereinafter, the arti-  
ficial sweetener may be present in an amount of from  
about 0.05 to about 0.35% by weight, and preferably,  
10 from about 0.03 to about 0.25% by weight.

The liquid fill itself will generally  
comprise from about 5 to about 15% by weight, and  
preferably, from about 7 to about 10% by weight of  
the final chewing gum piece itself.

15 The preferred liquid fill compositions in  
accordance with the present invention are as follows:

		<u>Parts by Weight</u>
20	Glycerin (containing up to 2% bound up water)	95 to 99.5
	Thickener	5 to 0.80
	Optional sweetener	
	sugar	0 to 5.0
25	sugar alcohol	0 to 5.0
	artificial sweetener	0 to 0.20

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1           Flavors which are especially useful in the  
liquid fill comprise flavor oil, including acids  
such as adipic, succinic and fumaric acid, citrus  
oils such as lemon oil, orange oil, lime oil,  
5   grapefruit oil, fruit essences such as apple essence,  
pear essence, peach essence, strawberry essence,  
apricot essence, raspberry essence, cherry essence,  
plum essence, pineapple essence, as well as the  
following essential oils: peppermint oil, spearmint  
10 oil, mixtures of peppermint oil and spearmint oil,  
clove oil, bay oil, anise oil, eucalyptus oil,  
thyme oil, cedar leaf oil, cinnamon oil, oil of  
nutmeg, oil of sage, oil of bitter almonds, cassia  
oil, and methylsalicylate (oil of wintergreen).  
15 Various synthetic flavors, such as mixed fruit, may  
also be incorporated in the center fill.

As indicated, in addition to the glycerin,  
the liquid fill may include a natural sugar or  
non-sugar sweetener.

20           The term "natural sugar" includes one or  
more sugars or sugar containing material, or sugar  
alcohols, for example, monosaccharides of 5 or 6  
carbon atoms, such as arabinose, xylose, ribose,  
glucose, mannose, galactose, fructose, dextrose,  
25 or sorbose or mixtures of two or more of the  
foregoing monosaccharides; disaccharides, for example,  
sucrose such as cane or beet sugar, lactose, maltose  
or cellobiose; polysaccharides, such as partially  
hydrolyzed starch, dextrin or corn syrup solids,  
30 or sugar alcohol, such as sorbitol, xylitol, mannitol  
or arabitol.

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1           In addition, as mentioned hereinbefore, the  
glycerin may be employed together with an artificial  
or non-sugar sweetener or sugar substitute, such as  
sodium calcium or ammonium saccharin salts,  
5   dihydrochalcones, glycyrrhizin, dipotassium gly-  
cyrrhizin, glycyrrhizic acid ammonium salt, the sodium  
salt of cyclohexyl sulfamic acid, L-aspartyl-L-phenyl-  
alanine methyl ester, the potassium salt of 3,4-di-  
hydro-6-methyl-1,2,3-oxathiazine-4-one-2,2-dioxide  
10   (Acesulfame-K), as well as Stevia rebaudiana (Stevioside),  
Richardella dulcifica (Miracle Berry), Dioscoreophyllum  
cumminsii (Serendipity Berry), cyclamate salts, and the  
like, or mixtures of any two or more of the above.

          The center-fill portion of the chewing gum  
15   of the invention may be prepared by adding the  
thickening agent, preferably carboxymethyl cellulose,  
in the form of a powder to glycerin (which may be  
of commercial grade), and mixing until the thickening  
agent is dispersed throughout the glycerin to form  
20   a pourable colloidal gel or colloidal dispersion.  
No water need be added; the thickener is not and need  
not be dissolved in water. The other ingredients,  
namely flavors and/or sweeteners, may be added to the  
glycerin before or after adding the thickening agent.

25           The chewing gum portion of the center-filled  
chewing gum of the invention may comprise conventional  
sugarless or sugar-containing chewing gums. Inasmuch  
as the glycerin-thickening agent containing liquid  
center fill described herein will preferably be sugar-  
30   free, the center fill is especially suitable for use

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1 in conjunction with sugar-free chewing gum. An example  
of a particularly preferred chewing gum for use herein  
which has good extrusion properties as well as long  
shelf-life and long-term flexibility includes gum  
5 base; and as a plasticizer-sweetener combination, a  
hydrogenated starch hydrolysate and a major amount  
of sorbitol, optionally one or more other sugar  
alcohols, such as mannitol or xylitol; optionally  
one or more additional sweetening agents, such as  
10 sugar and/or non-sugar sweeteners such as any of those  
described above; and optionally additional flavoring  
materials, one or more softeners, emulsifiers and/or  
filler. The preferred chewing gum itself does not  
require an aqueous plasticizer or syrup such as  
15 corn syrup, although such materials may be present,  
is desired.

The hydrogenated starch hydrolysates employed  
herein may include those disclosed in Reissue Patent  
No. 26,959 or U.S. Patent No. 3,556,811 as well  
20 as various hydrogenated glucose syrups and/or powders  
which contain sorbitol, hydrogenated disaccharides,  
hydrogenated tri- to hexa-saccharides, and hydrogenated  
higher polysaccharides, or mixtures of any two or more  
of the above.

25 The hydrogenated glucose syrups and or  
powders may be produced by catalytic hydrogenation  
of standard glucose syrups (acid and/or enzyme converted)  
to the point where all the glucose end groups of the  
saccharides are reduced to alcohols, that is, dextrose  
30 end groups to sorbitol end groups. In the case of



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1 hydrogenated glucose syrups, the total solids are  
made of from about 4 to about 30% sorbitol, from  
about 5 to about 65% hydrogenated disaccharides  
(that is, maltitol), from about 15 to about 75% tri- to  
5 hepta-hydrogenated saccharides, and from about 10  
to about 65% hydrogenated saccharides higher than  
hepta.

The preferred chewing gum for use in forming  
the center-filled chewing gum of the present invention  
10 comprises a sugarless chewing gum wherein the hydro-  
genated starch hydrolysate is employed in combination  
with sorbitol powder, and optionally, liquid sorbitol,  
other sugar alcohols, such as mannitol and/or xylitol,  
and/or gum arabic. The hydrogenated starch hydrolysate  
15 will be employed in a weight ratio to the sorbitol  
powder of within the range of from about 3:1 to about  
1:30, preferably from about 0.9:1 to about 0.1:1, and  
more preferably from about 0.6:1 to about 0.1:1. Such  
preferred sugarless compositions contain from about 2  
20 to about 60% by weight of hydrogenated starch hydroly-  
sate, and preferably from about 2 to about 20% by  
weight hydrogenated starch hydrolysate, and the sorbitol  
powder is present in an amount within the range of from  
about 10 to about 75%, and preferably from about 10  
25 to about 65% by weight.

In one embodiment of the chewing gum, sorbitol  
syrup or solution may also be employed in a weight  
ratio of sorbitol powder: sorbitol solution of within  
the range of from about 6:1 to about 2:1.

30 In general, sorbitol syrup may be present  
in an amount to provide from 0 to about 10% by weight

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- 1 sorbitol and preferably from about 1 to about 8%  
sorbitol based on the weight of the final chewing  
gums. Use of the sorbitol in the form of the syrup  
or solution increases moisture content and thus  
5 softness of the gum.

- In another embodiment of the chewing gum,  
gum arabic, preferably in the form of a solution,  
is employed in combination with the hydrogenated  
starch hydrolysate and sorbitol powder to provide  
10 improved textural properties. The gum arabic will  
normally be employed as aqueous solutions containing  
from 30 to about 60% gum arabic, so as to provide an  
amount of gum arabic of within the range of from 0  
to about 4%, and preferably from about 1 to about  
15 3% by weight based on the weight of the chewing gum.

- The chewing gum will also preferably include  
mannitol to provide improved sweetness, texture and  
processing. The mannitol will be present in an amount  
ranging from 0 to about 20%, and preferably from about  
20 5 to about 10% based on the weight of the chewing gum.

- Where the above-described hydrogenated  
starch hydrolysate is employed in combination with the  
sorbitol and optionally mannitol and/or gum arabic,  
the resulting gum has been found to have a soft, pliable  
25 texture superior to sugarless formulations containing  
no hydrogenated starch hydrolysate. In addition, such  
chewing gum composition, which usually will be of the  
non-sugar type, has good softness retention properties  
and improved flexibility as it ages on the shelf and  
30 has excellent extrusion properties.

1           The hydrogenated starch hydrolysate as  
described above may be employed as a substitute  
for corn syrup or other plasticizer or softener,  
sugar and even sugar alcohols. A typical sugar-free  
5 gum formulation may contain from about 2 to about  
70%, and preferably from about 4 to about 60% by  
weight of the hydrogenated starch hydrolysate.  
Such formulations may include the hydrogenated  
starch hydrolysate in the form of a powder and/or  
10 aqueous syrup; where present, the syrup (2 to 25%  
hydrogenated starch hydrolysate) will be employed  
in a weight ratio to the powder of within the range  
of from about 0.2:1 to about 0.5:1, and preferably  
from about 0.2:1 to about 0.3:1. The use of the  
15 hydrogenated starch hydrolysate in syrup form,  
as in the case of the sugar alcohols, increases  
moisture content of the gum formulation and enhances  
softness properties thereof.

          The hydrogenated starch hydrolysate  
20 preferably in the form of its syrup, may also be  
employed in bubble gum formulations to produce a  
soft, pliable product, the degree of softness being  
controllable by changing the amount of syrup employed.  
In the bubble gum formulations of the invention, the  
25 hydrogenated starch hydrolysate may be employed  
with or without sugar (which when present will pro-  
vide from about 10 to about 90% by weight of the  
bubble gum formulation) or with artificial or non-  
sugar sweeteners as described herein.

30           The chewing gum will include a relatively

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1 water-insoluble, water-impenetrable gum base in an  
amount ranging from about 8 to about 50%, and  
preferably from about 15 to 40% by weight of the  
chewing gum composition.

5 In general, the gum base is prepared by  
heating and blending various ingredients, such as,  
natural gum, synthetic resins, waxes, plasticizers,  
etc., in a manner well known in the art. Typical  
examples of the ingredients found in a chewing gum  
10 base are masticatory substances of vegetable origin,  
such as chicle, crown gum, nispero, rosidinha,  
jelutong, pendare, perillo, niger gutta, tunu, etc.,  
masticatory substances of synthetic origin, such as  
butadiene-styrene polymer, isobutylene-isoprene  
15 copolymer, petroleum wax, polyethylene, polyisobutylene,  
polyvinylacetate, etc., plasticizers, such as lanolin,  
stearic acid, sodium stearate, potassium stearate, etc.,  
antioxidants, such as butylated hydroxyanisole, butylated  
hydroxytoluene, and propyl gallate.

20 The water-insoluble gum base may consist of  
any conventional gum bases, such as disclosed for  
example in U.S. Patents Nos. 3,052,552 and 2,197,719.

The chewing gum may also include flavoring,  
such as sour or fruit flavoring or non-acid or mint  
25 flavoring in an amount ranging from about 0.3 to about  
2.0% by weight, and preferably from about 0.5 to about  
1.2% by weight of the final gum product. The flavoring  
may comprise synthetic flavors and oils derived from  
plants, leaves, flowers, fruit, etc. Representative  
30 flavor oils of the type described above with respect

1 to the liquid center fill may also be employed in  
the chewing gum itself.

The chewing gum may contain a sugar sweetener  
or non-sugar sweetener as described above with respect  
5 to the center fill. Where present, the natural sugar  
or sugar alcohol may be employed in an amount ranging  
from about 85 to about 0.05% by weight of the gum.

The chewing gum may also contain conventional  
ester gums, polydextrose, fillers, such as calcium  
10 carbonate, and texturizers, such as hydrated alumina,  
plasticizers, softeners or emulsifiers, such as  
lecithin, fatty acids, glycerin, isomaltitol, glyceryl  
monostearate, hydrogenated vegetable oils, sorbitan  
monostearate, tallow, propylene glycol, F.D.&C. coloring  
15 agents, and other conventional chewing gum additives  
as will be apparent to those skilled in the art.

The chewing gum itself may be prepared  
employing conventional chewing gum manufacturing  
techniques. However, the various sweeteners and/or  
20 hydrogenated starch hydrolysate may be provided in  
a form to ensure relatively slow release or slow  
solubilization in the saliva. Thus, for example,  
the sweetener and/or hydrogenated starch hydrolysate  
may be coated with, integrated with or encapsulated  
25 with non-toxic water-insoluble polymeric substances  
such as polyvinyl esters disclosed in U.S. Patents  
Nos. 3,826,847 and 3,795,744, organic acids as  
disclosed in U.S. Patent No. 3,761,288, or other  
known edible materials as, for example, any of the  
30 fusing agents disclosed in U.S. Patent No. 3,928,633,

1 as well as hydrophilic colloids such as ethyl  
cellulose, paraffin wax or sodium alginate. The  
sweetener and/or hydrogenated starch hydrolysate,  
so-modified and employed in conjunction with con-  
5 ventional carriers as described above, will be slowly  
solubilized in the saliva over extended periods of  
time.

Alternatively, where it is desired to  
achieve slow release, non-sugar or artificial sweetener  
10 (where employed) will be in particulate form having  
an average particle size of below about 150 microns  
(0.150 mm or about 100 mesh), and will be incor-  
porated into the gum base portion of the chewing  
gum. The particulate compound will be substantially  
15 retained in the gum base, and during chewing undergoes  
slow and controlled release into the saliva.

The preferred chewing gum for use in the  
present invention may be prepared by admixing melted  
gum base (heated at, for example, 160-170°F),  
20 softener, such as lecithin, and color, if desired,  
optionally adding polyol sweetener, such as mannitol,  
to the mix, and mixing for 2-5 minutes, adding  
hydrogenated starch hydrolysate alone or optionally  
with gum arabic and/or glycerin and mixing for 2 to  
25 7 minutes, adding a portion of the sorbitol and a  
portion of the flavor while mixing for 2 to 5 minutes,  
and thereafter repeating the last step adding additional  
portions of sorbitol and flavor until all the sorbitol  
and flavor have been added, and then optionally adding  
30 spray-dried flavor and mixing the entire mass for 2 to

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1 5 minutes.

The chewing gum portion for use in center-fill gum of the invention may also be prepared by mixing melted gum base (heat at, for example, 160-170°F) and color, adding about one-third of the hydrogenated starch hydrolysate and mixing for 1 to 3 minutes, if desired, adding polyol, such as mannitol, to the mix, and mixing for 1-5 minutes, adding sorbitol (in the form of powder), and softener, such as lecithin, flavor, and glycerin (where employed), and when a smooth mixture is obtained, optionally, adding sorbitol solution, then adding the remaining hydrogenated starch hydrolysate alone or with gum arabic, and then optionally adding spray-dried flavor and admixing the entire mass for 2 to 5 minutes.

If desired, the chewing gum formed by the above methods may be mixed with one or more easily extractable water-soluble sweeteners, such as natural sugar, soluble saccharin salts, aspartame, water-soluble food acid and/or flavors. The resulting mix is then formed into sticks or tablets of chewing gum employing conventional techniques.

Where, in the above method, it is desired to employ a soluble non-sugar sweetener in a chewing gum containing an aqueous plasticizer (such as the hydrogenated starch hydrolysate in syrup form), the soluble non-sugar sweetener will be added to the gum base ingredients before the aqueous plasticizer is added thereto. In this manner, the soluble non-sugar sweetener will be transferred to the gum base and will

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1 not be first dissolved in the plasticizer.

Regardless of the solubility of the non-sugar sweetener to be added, where long lasting flavor or sweetness is desired, whether it be the hydrogenated starch hydrolysate and/or other sweetener, it is preferred that the particles of non-sugar or artificial sweetener have an average particle size of less than 150 microns to ensure slow controlled release into the saliva.

10 Preferred sugarless chewing gums for use in accordance with the present invention wherein the hydrogenated starch hydrolysate is employed as a sugar substitute for bulking purposes will have the following compositions:

Parts by weight

Gum base	18-35
Mannitol	0-18
Flavor	0.5-2.5
Sorbitol powder	30-65
Softener (e.g., lecithin)	0.5-2
Hydrogenated starch hydro- lysate (on wet basis)	3-20
Gum arabic (based on 30-70% solution)	0-12
Glycerin	0-4
Sorbitol solution (based on 40 to 70% solution)	0-25



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1 Preferred sugarless chewing gum formulations  
for use in accordance with the present invention  
wherein hydrogenated starch hydrolysate is the sole  
binding agent and aid in processing are as follows:

5

	<u>Parts by Weight</u>
Gum base	20-35
Mannitol	6-18
10 Flavor oil	0.5-2.5
Sorbitol powder	30-55
Softener (e.g., lecithin)	0.5-2
Hydrogenated starch hydro-	
lysate (on wet basis)	10-18
15 Glycerin	0-4

Preferred sugarless chewing gum formulations  
for use in accordance with the present invention  
wherein hydrogenated starch hydrolysate is employed  
20 in conjunction with gum arabic solutions to aid in  
extrusion are as follows:

	<u>Parts by Weight</u>
25 Gum base	18-30
Mannitol	0-10
Flavor oil	0.5-2.5
Sorbitol powder	40-65
Softener (e.g., lecithin)	0.5-2
30 Gum arabic solution (40 to	
60% gum arabic)	4-10
Hydrogenated starch	
hydrolysate (wet basis)	5-12
Glycerin	1-4

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1 Preferred sugarless chewing gums for use  
in accordance with the present invention wherein the  
hydrogenated starch hydrolysate is employed in con-  
junction with sorbitol solution (as plasticizer) will  
5 have the following compositions:

		<u>Parts by Weight</u>
	Gum base	18-30
10	Hydrogenated starch hydrolysate (wet basis)	5-12
	Mannitol	0-10
	Sorbitol powder	40-60
	Sorbitol liquid (50 to 80% solution)	10-20
15	Glycerin	0-4
	Softener (lecithin)	0.5-2
	Flavor	0.5-2.5

20 Preferred sugarless gum formulations for  
use in accordance with the present invention are  
as follows:

		<u>Parts by Weight</u>
25	Gum base	18-25
	Mannitol	0-10
	Hydrogenated starch hydrolysate (wet basis)	10-20
	Sorbitol powder	40-60
30	Softener (lecithin)	0.5-1.5
	Glycerin	1-3
	Flavor	0.3-1.5

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1            Again, the above sugarless chewing gum is  
particularly suitable for use in making liquid center  
chewing gum of the invention. However, other con-  
ventional sugar-containing or sugarless chewing gum  
5 compositions may be employed.

          The center-filled chewing gum of the  
invention may be prepared as described in U.S.  
Patents Nos. 3,806,290 and 3,857,963.

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The following Examples illustrate preferred  
embodiments of the present invention without, however,  
limiting the same thereto. All temperatures are  
expressed in °F.

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EXAMPLE I

A. A center fill for chewing gum in accordance with the present invention is prepared by adding, with mixing, 1.0 lb. of carboxymethyl cellulose 7HF (Hercules) to 99 lb. of glycerin (commercial grade containing 2% water) to form a colloidal dispersion. Flavor oil is then added together with coloring to form the center fill.

10

B. A sugarless chewing gum is prepared from the following ingredients:

	<u>Parts by Weight</u>
15	
Gum Base	30
Mannitol	15
Sorbitol powder	40
Hydrogenated starch hydroly-	
sate syrup (78% solids,	
20 including 6% sorbitol	
and 56% maltitol)	12
Softener (lecithin)	1
Spearmint oil	1
25 Color	0.1

25

The gum base is melted (160-175°F) and placed in a preheated standard dough mixer equipped with sigma blades. Lecithin and color are added and mixed for 4-5 minutes. Hydrogenated starch hydrolysate syrup is added and mixed for 4-5 minutes. Thereafter, about one-third of the sorbitol is

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1 slowly added followed immediately with one-third  
of the flavor and mixed for about 2-3 minutes.  
The last step is repeated until all sorbitol and  
flavor are added.

5

C. The center-filled gum formed from the  
above chewing gum portions and center fill is pre-  
pared employing the procedure outlined in U.S.  
Patent No. 3,857,963.

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The center-filled chewing gum so-prepared  
is found to have excellent sweetness and flavor  
and a long shelf-life.

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EXAMPLES II and III

5 Sugarless center-filled chewing gums are prepared from the following ingredients employing the procedure outlined in Example I except that 2 lb. of glycerin 7MF (Hercules) containing 2% bound up water is employed in place of the glycerin 7HF, and in preparing the chewing gum portion glycerin is added directly after the hydrogenated starch hydrolysate.

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		<u>Parts by Weight</u>	
<u>Gum portion</u>		<u>Ex. 2</u>	<u>Ex. 3</u>
	Gum base	22	24
	Mannitol	8	10
15	Sorbitol powder	50	47
	Hydrogenated starch		
	syrup (on dry basis)	16	15
	Glycerin	2	2
	Lecithin	0.5	0.5
20	Fruit flavor	1.5	0
	Spearmint flavor	0	1.2
	Color	0.05	0.1
<u>Center-fill portion</u>			
25	Glycerin (2% water)	98	97
	Flavor oil	0.2	0.5
	Carboxymethyl cellulose 7MF	2.0	2.0

30 The Examples II and III chewing gums are found to have a pleasant sweet taste, good softness retention, improved flexibility properties and excellent extrusion properties, and excellent shelf-life.

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EXAMPLES IV TO VI

Center-filled sugarless chewing gums are prepared from the following ingredients:

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		<u>Parts by Weight</u>		
<u>Chewing gum portion</u>		<u>Ex. 4</u>	<u>Ex. 5</u>	<u>Ex. 6</u>
	Gum base	22	22	22
	Sorbitol powder	54	48	47
10	Sorbitol solution (70%)	13	12	12
	Hydrogenated starch hydrolysate syrup (dry basis)	8.5	8	10
	Mannitol	--	8	5
15	Lecithin	0.5	0.5	0.5
	Flavor	1.7	1.6	1.2
	Color	0.07	0.05	0.1
	Glycerin	--	--	2
<u>Center-fill portion</u>				
20	Glycerin	98	97	97
	Flavor oil	0.2	0.3	0.2
	Carboxymethyl cellulose 7HF	1.2	1.5	1.0

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A procedure similar to that described in Examples I to III is employed except that sorbitol solution and color are added after the hydrogenated starch hydrolysate.

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The above chewing gum is found to have properties similar to that of the Examples I to III gums.



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EXAMPLE VII

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The chewing gum portion of the center-filled sugarless chewing gum is prepared from the following ingredients:

	<u>Chewing gum portion</u>	<u>Parts by Weight</u>
	Gum base	30
	Sorbitol powder	40
10	Hydrogenated starch hydroly-	
	sate syrup (56% solids,	
	including 6% sorbitol	
	and 56% maltitol)	12
	Softener (lecithin)	1
15	Spearmint oil	1
	Color	0.1
	Mannitol	15
	<u>Center-fill portion</u>	
	Glycerin	98
20	Carboxymethyl cellulose 7MF	2

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The gum base is melted (160-175°F) and placed in a pre-heated standard dough mixer equipped with sigma blades. Color is added and mixed for 3-4 minutes. About one-third of the hydrogenated starch hydrolysate syrup is added and mixed for 1-3 minutes. Mannitol is added and mixed for 1-2 minutes. Thereafter, the sorbitol is slowly added followed immediately with lecithin and flavor and mixed for about 2-3 minutes. The remaining hydrogenated starch hydrolysate is added and the mixture mixed for 2-5 minutes.

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1           The above chewing gum together with the  
center-fill composition as described in Example I  
are employed to form a center-filled chewing gum  
which is found to have a pleasant sweet taste, good  
5 softness retention and improved flexibility proper-  
ties upon aging and excellent extrusion properties,  
and excellent shelf-life.

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EXAMPLES VIII AND IX

5 Sugarless center-filled chewing gums are prepared from the following ingredients employing the procedure outlined in Example VII except that glycerin is added directly after the sorbitol powder in the chewing gum portion.

	<u>Chewing gum portion</u>	<u>Parts by Weight</u>	
		<u>Ex. 8</u>	<u>Ex. 9</u>
10	Gum base	22	24
	Mannitol	8	10
	Sorbitol powder	50	47
	Hydrogenated starch		
15	hydrolysate syrup		
	(on dry basis)	16	15
	Glycerin	2	2
	Lecithin	0.5	0.5
	Fruit flavor	1.5	0
20	Spearmint flavor	0	1.2
	Color	0.05	0.1
	<u>Center-fill formulation</u>		
	Glycerin	97	97
	Carboxymethyl cellulose 7MF	2	2
25	Flavor	0.25	0.5
	Sweetener	0.10	0.2

30 The Examples VIII and IX center-filled chewing gums are found to have a pleasant sweet taste, good softness retention, improved flexibility properties and excellent extrusion properties.

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EXAMPLES X to XII

Sugarless center-filled bubble gums are prepared from the following ingredients:

		<u>Parts by Weight</u>		
<u>Chewing gum portion</u>		<u>Ex. 10</u>	<u>Ex. 11</u>	<u>Ex. 12</u>
	Bubble gum base	22	26	26
	Sorbitol powder	57	49	49
10	Hydrogenated starch hydrolysate syrup	15	18	18
	Mannitol	5	5	5
	Lecithin	0.2	0.3	--
	Flavor	0.7	1.5	1.5
15	<u>Center-filled portion</u>			
	Glycerin	98	98	98
	Carboxymethyl cellulose 7HF	1	1	1
20	Pectin	0.5	0.8	0.6
	Gum tragacanth	0	0.2	0.3

A procedure similar to that described in Examples I to VI is employed in preparing the above bubble gums.

The above bubble gums are found to have a pleasant sweet taste, excellent softness retention, and improved flexibility and extrusion properties.

1 WHAT IS CLAIMED IS:

1. A center-filled chewing gum having improved softness retention, flexibility, and excellent  
5 shelf-life comprising a chewing gum piece including an enclosed cavity therein, and a liquid fill in said cavity, said liquid fill comprising glycerin as a sweetener and a thickener to increase viscosity of the glycerin, the glycerin being present in an amount of from about 94 to  
10 about 99.5% of said liquid fill.

2. The center-filled chewing gum as defined in Claim 1 wherein said glycerin is present in an amount within the range of from about 95 to 99% by weight of said liquid fill.

15 3. The center-filled chewing gum as defined in Claim 1 or 2 wherein said thickener is a natural or synthetic gum.

4. The center-filled chewing gum as defined in Claim 3 wherein said thickener is carboxymethyl cellulose, a pectin, an alginate, agar or gum tragacanth.  
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5. The center-filled chewing gum as defined in Claim 3 wherein said thickener is present in an amount within the range of from about 0.5 to about 6% by weight of the center fill.

25 6. The center-filled chewing gum as defined in any of claims 1 to 5 wherein said chewing gum piece is formed of sugarless chewing gum.

7. The center-filled chewing gum as defined in Claim 1 or 2 wherein said thickener is carboxymethyl  
30 cellulose or sodium carboxymethyl cellulose present in an amount of from about 1 to about 3% by weight of the center fill.

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1 8. The center-filled chewing gum as defined  
in any of Claims 1 to 7 wherein said glycerin contains up  
to about 2% by weight bound-up water.

5 9. The center-filled chewing gum as defined in  
any of Claims 1 to 8 further including one or more flavors  
and artificial sweeteners.

10 10. A sugarless liquid fill for center-filled  
chewing gum, said liquid fill comprising from about 94.0  
to about 99.5% by weight glycerin and from about 0.5 to  
about 6% by weight of a thickener.

11. The center-filled chewing gum as defined  
in Claim 10 wherein said thickener comprises carboxymethyl  
cellulose or sodium carboxymethyl cellulose.

15 12. A process for preparing a center-filled  
chewing gum as defined in Claim 1, which comprises adding  
a thickener to glycerin to form a center fill and incor-  
porating the center fill into the cavity of said chewing  
gum piece.

20 13. The process as defined in Claim 12 wherein  
said thickener is carboxymethyl cellulose or sodium carboxy-  
methyl cellulose.

25 14. The process as defined in Claim 12 or 13  
wherein said glycerin comprises 95 to 99% of said center  
fill and said thickener comprises 1 to 5% said center fill.

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European Patent  
Office

# EUROPEAN SEARCH REPORT

0086856  
Application number

EP 82 10 1278

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
E	--- US-A-4 316 915 (D.R.FRIELLO et al.) *Columns 1-12*	1-14	A 23 G 3/30
Y	--- US-A-4 292 329 (K.OGANA et al.) *Column 2, table 1, lines 35-40,51; claims 5,10*	1,3-10 12,14	
D,Y	--- US-A-4 156 740 (M.GLASS et al.) *Abstract; claims 1,2*	1-14	
Y	--- US-A-4 250 196 (D.R.FRIELLO) *Column 1, lines 10-26; column 2, lines 6-68; column 3, lines 3-8; column 6, lines 5-10,40-48; claims 1-13*	1-14	
D,A	--- GB-A-1 469 031 (WARNER-LAMBERT COMP.)		TECHNICAL FIELDS SEARCHED (Int. Cl. 3) A 23 G
D,A	--- US-A-3 894 154 (A.H.GRAFF et al.)		
A	--- DE-A-2 850 989 (H.WILCKEN et al.) -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10-02-1983	Examiner GUYON R.H.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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No. 82 101 278.8

Nabisco Brands, Inc.

36 451 o/pc

June 13, 1983

AMENDED  
CLAIMS

Claims:

1. A center-filled chewing gum having improved softness retention, flexibility, and excellent shelf-life comprising a chewing gum piece including an enclosed cavity therein, and a liquid fill in said cavity said  
5 liquid fill comprising glycerin as a sweetener and a thickener to increase viscosity of the glycerin, characterized in that the glycerin is present in an amount of from 94 to 99.5 % of said liquid fill.

2. The center-filled chewing gum as defined  
10 in Claim 1 wherein said glycerin is present in an amount within the range of from ~~about~~ 95 to 99% by weight of said liquid fill.

3. The center-filled chewing gum as defined in Claim 1 or 2 wherein said thickener is a natural or  
15 synthetic gum.

4. The center-filled chewing gum as defined in Claim 3 wherein said thickener is carboxymethyl cellulose, a pectin, an alginate, agar or gum tragacanth.

5. The center-filled chewing gum as defined  
20 in Claim 3 wherein said thickener is present in an amount within the range of from ~~about~~ 0.5 to ~~about~~ 6% by weight of the center fill.

6. The center-filled chewing gum as defined in any of claims 1 to 5 wherein said chewing gum piece  
25 is formed of sugarless chewing gum.

7. The center-filled chewing gum as defined in Claim 1 or 2 wherein said thickener is carboxymethyl cellulose or sodium carboxymethyl cellulose present in an amount of from ~~about~~ 1 to ~~about~~ 3% by weight of the  
30 center fill.



AMENDED  
CLAIMS

8. The center-filled chewing gum as defined in any of Claims 1 to 7 wherein said glycerin contains up to about 2% by weight bound-up water.

5 9. The center-filled chewing gum as defined in any of Claims 1 to 8 further including one or more flavors and artificial sweeteners.

10 10. A sugarless liquid fill for center-filled chewing gum, said liquid fill comprising from ~~about~~ 94.0 to ~~about~~ 99.5% by weight glycerin and from ~~about~~ 0.5 to ~~about~~ 6% by weight of a thickener.

11. The center-filled chewing gum as defined in Claim 10 wherein said thickener comprises carboxymethyl cellulose or sodium carboxymethyl cellulose.

15 12. A process for preparing a center-filled chewing gum as defined in Claim 1, which comprises adding a thickener to glycerin to form a center fill and incorporating the center fill into the cavity of said chewing gum piece.

20 13. The process as defined in Claim 12 wherein said thickener is carboxymethyl cellulose or sodium carboxymethyl cellulose.

14. The process as defined in Claim 12 or 13 wherein said glycerin comprises 95 to 99% of said center fill and said thickener comprises 1 to 5% said center fill.